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REVIEW OF THE
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Old Friends.

The old old friends!
Some changed; some buried; some gone out of sight;
Some enemies, and in this world's swift flight
No time to make amends.

The old old friends—
Where are they? Three are lying in one grave;
And one from the far-off world on the daily wave
No loving message sends.

The old dear friends!
One passes daily; and one wears a mask;
Another long estranged cares not to ask
Where causeless anger ends.

The dear old friends,
So many and so fond in days of youth!
Alas that Faith can be divorced from Truth,
When love in severance ends.

The old old friends!
They hover round me still in evening shades:
Surely they shall return when sunlight fades,
And life on God depends.

W. J. LINTON.

The Edison Electric Light on the Steamship Queen of the Pacific.

This new steamship, belonging to the Oregon Railway and Navigation Company, is lighted throughout with the Edison light, except the hold and pilot house. There are in all 246 B lamps, of which 12 are of 16 candle power, and the balance of 8 candle power. There are 2 Z dynamos driven by direct belt connection with the engine. The lamps are so arranged that any individual lamp or section of lamps may be lighted or extinguished at pleasure, all switches being placed under control of the steward. One switch controls all lamps forward of the engine room, another all the lamps in the steerage, and the balance are divided among the staterooms, offices, engine room, saloon, dome, shaft alley, &c. The wires are all carefully concealed from view, and yet are easily gotton at for the purposes of repairs and addition. On the trial trip every lamp came up perfectly, and entire satisfaction was expressed by all. The following description of this installation is taken from a recent number of the *Nautical Gazette*:

"The Queen of the Pacific is lighted throughout by the Edison Electric Light system, and she is the most perfectly lighted of any vessel in the world, there being about 250 electric lights distributed through the ship, with connections for placing lights on the wharves at her loading and discharging ports on her route. * * * These lamps are screwed into a socket in the ceiling of each stateroom, water closet, the butcher's shop, mess room, engine and boiler rooms, shaft alley, all the officers' rooms, crews' quarters, steerage, galley, pantry, passage way, 'glory hole,' etc. These lights are so arranged in groups that the steward can turn off the lights in the state rooms, the saloons, in the dome, or in fact, any section of his department at will, or can turn on or off any individual light. In the officers' rooms, or the engine department, each light is manipulated at will or as a whole as desired. There is absolutely no danger from heat, fire or explosion in this system. The "safety-catch" precludes the possibility of fire. For lighting steam vessels this light is cheaper, cleaner and safer than any other means of illumination. The steamer Columbia of this line was fitted with the Edison light in 1879, and the success of the system has been very marked. She had 115 lamps in circuit in February last, and they had been run over 415 hours, without even one lamp going out, the expence being, for the 115 lamps, with coal at $6 per ton, only 18 cents per hour. The City of Worcester, of the N. Y. & Norwich Line, is also fitted with the Edison lights. The Queen of the Pacific has two dynamos run by an 18 horse power (nominal) engine, while the average power to light the vessel is about 10 horse. One of the beauties of this system is that no special engineer or electrician is required to attend the machinery, and it only requires a few minutes attention daily for oiling, etc. One of the special features of this system of lighting is, there are no smoky lamps, the windows and doors of staterooms and saloons can be kept open, where, with ordinary lamps, they would have to be shut, with a great saving in breakage of chimneys, globes, etc."

The Suez Canal and War.

The statistics of the Suez Canal explain why England is resolved to fight rather than lose control of Egypt. It was in August, 1869, that Count de Lesseps finished his great work and saw the waters of the Mediterranean and the Red Sea meet, but it was not until November, 1875, that it was known that Lord Beaconsfield had purchased 176,602 of the 400,000 shares of the canal, paying the Khedive of Egypt $20,400,000 for them. In 1870 but 486 vessels passed through the canal, and the receipts were but $1,631,865. But in 1875 the number of vessels was 1,494, and the receipts were $5,777,260. Last year the number of vessels was 2,727, and the earnings were $10,254,800. And of the 5,794,000 tonnage of the traffic of 1881, not less than 82 per cent. belonged to England. The loss of power in Egypt not only exposes England to the loss of much of what she paid for her canal shares, but what is vastly greater—to the loss of the control of her great highway to India. It is evident from these facts that England is in earnest in her demand for a restoration of the *status quo* in Egypt; and, if the powers do not effect it, there certainly will be war between Englishmen and Arabs. And if the powers do not act promptly, English impatience may not be restrained. The demand for immediate action on the part of the powers is most urgent.

The *Tribune* represents the general interest and feeling here in the following remarks: "We should be a strange people, indeed, if we could listen without deep interest to echoes of the cannon of Mother England in the land of the Pharaohs. Egypt, under its present rulers, is little to us, but England is much. No American historian has hesitated, even in times of sorest feeling toward the mother country, to recognize the fact that civilization and Christianity have made enormous strides, in every quarter of the globe, under the shelter of the British flag. The substitution of British justice for Turkish rapacity or Arabic lawlessness would be hailed by the commerce of the whole world as a blessing. Though neither the British Government nor the English people have any desire to assume the responsibility of governing Egypt, any increase of British influence in that quarter would probably be beneficial. The struggle that that is now threatening can hardly fail to result either in a great increase or in a marked diminution of English influence in Egypt. In such a struggle, American sympathies must go out strongly toward the mother country so long as it is contending only for order and justice."

Interfering Electrical Currents on Long Telephone Lines.

A serious trouble is making itself very apparent at the present time upon many of the long and extra-territorial telephone lines at different points. It is not confined to any one locality, but has been noticed at several places.

This trouble is a violent noise as of rushing water, and as the Scriptures phrase it, the violent "crackling of thorns under a pot." The noise sometimes becomes so overpoweringly intense, as to drown the articulate speech transmitted almost entirely.

The annoyance appears to be intermittent in character, and wherever it has appeared shows similar periods of violence and intermission.

Starting out in the morning the lines appear to be pretty clear from extraneous currents, and consequently from noise. Towards eleven A. M. the crackling commences, increasing in intensity steadily, through the hour of noon, and until three P. M., after which time it may be noticed to abate; until from

four and throughout the evening, the lines are once more fairly quiet.

In some parts of the country the performance recommences about eleven P. M., and is kept up with more or less vigor, varying from the persistent frying to the steady rushing noises through the night.

This is of course one of the most troublesome phenomena that can possibly affect long lines, and if possible, its origin must be ascertained, and its cause removed; or else some way found to neutralize its influence.

The experience of the writer, and the information at his command, point to the conclusion that east and west lines are troubled in this manner more frequently than lines running north and south; and this may be accounted for by the fact that the earth being a large magnet of course throws out lines of force from its poles in directions corresponding to those derived from the poles of an ordinary magnet.

East and west telephone lines cross these lines of force, and when the wires are thrown into vibrations by the influence of the wind, magneto currents are generated in them just as in the ordinary magneto bell, the wires of the armature coil, when rotated, cross continually the lines of force of the field magnets, and thus have currents generated in them.

This theory would lead anyone to suppose that if the wires could be so erected as to be parallel to the lines of force instead of crossing them, the trouble would be partly obviated; and this could no doubt be none by building with a long curve, so that at one end the line wires would tend either northward or southward, and would gradually curve, and about the middle of the line commence to trend in the opposite direction until it arrived at the desired point. This, of course, would take a great deal more wire, but if the trouble could be thus obviated it would be worth while.

Much of the noise is also undoubtedly due to magnetic storms, which in this year of grace, 1882, have been very numerous. In fact, commencing with the great aurora of April, there has been a constant succession of magnetic storms, these causing corresponding electric currents in the earth and atmosphere, and these in turn making themselves apparent through the instrumentality of that most sensitive of electroscopes—the telephone.

Since, however, our planet has always been subject to such magnetic storms, we may hope that they will ere long cease for a season and remove this cause of trouble.

If one part of the line is more affected than another by the noise, it may be found beneficial to double a portion of the line back on itself, so that the current in one wire will tend to neutralize that in the other wire.

Between Liverpool and Manchester, in England—cities which are between thirty and forty miles apart—the trunk lines are all worked in pairs in metallic circuit, and at each terminus are passed through one circuit of an induction coil. Any ground circuit line to be attached at either end is made to pass through the other circuit of the induction coil, and by this method all the advantages of the metallic circuit are maintained, while the exchange lines are merely ground circuits as usual.

The induction coil, instead of being of the ordinary kind, possessed of a coarse, primary coil and fine secondary, has two long, fine wires wound together throughout, and each terminating in a pair of binding screws. The two long lines are connected with the two binding screws of one of the wire coils, and a ground wire with one screw, and the short exchange line with the other screw of the other coil. The same apparatus has been tried in this country, and was found to work fairly well, yet with some loss of volume, by reason of the repetition.

It would seem a good idea, where long lines are subject to periodic noises, to build at least two lines, which might be used separately when the disturbing force was not active, and which might be adapted by means of a switch, to be made into one metallic circuit on the recurrence of the trouble. The switch could easily be arranged either at one or both of the termini to unite the ends of the lines through the induction coil.

These ideas are presented, not as being known facts, but simply in the idea that, where nothing is absolutely and certainly known upon any subject, any thoughts or theories thereupon can do no harm, and may lead to others which will eventually result in the necessary knowledge.

The Edison Lamps and the Faure Accumulator.

According to the *Electrotechnische Zeitschrift*, the General Direction of the German State Railways has caused the carriages to be lighted up by Edison lamps, supplied by Faure's accumulators, of which 30, weighing 360 kilos, kept an Edison lamp of 10 candle-power in action for 120 hours. The elements are charged during the day by the same machine, which by night sets the Edison lamps in action at the Strasburg station. The accumulators have been constructed by the Telegraph Controller, Schulze.

Report of the Incandescent Lamps Exhibited at the International Exposition of Electricity, Paris, 1881.

The following report by the Sub-Committee appointed to investigate the incandescent lamps shown in action during the late Electrical Exhibition in Paris will be found of considerable value to those of our readers engaged in electric lighting. Included amongst the names on this commission were those of Professors W. Crookes and G. F. Barker.

I. Description of the Lamps.

The only lamps in the exhibition which were purely incandescent in character were those of Edison and Maxim, in the United States section, and those of Swan and Lanefox, in that of Great Britain. The idea represented in these lamps is essentially the same in all of them, the differences being, for the most part, details of construction. They all consist of a glass envelope more or less spherical in form, in which is enclosed a carbon loop, made of carbonized organic material, and supported upon wires of platinum sealed into the glass. The space in the interior of the lamp is very perfectly exhausted.

A. The Edison Lamp.

The Edison lamp is pear-shaped in form. The carbon filament is long and fine, and is bent into the shape of a U. It is made from Japanese bamboo, cut to the requisite size in a gauge. In section it is nearly square, being about 0.3 millimeter on a side, the ends being left considerably wider. The fiber is carbonized in moulds of nickel, and is attached to the conducting wires by copper, electrolytically deposited them.

B. The Swan Lamp.

The Swan lamp is globular in form, the neck being quite long. The carbon filament is made from cotton-thread, parchmentized before carbonization by treatment with strong sulphuric acid. The ends of this filament are very much thickened, and the loop has a double turn at the top. Its ends are clamped in a pair of metal holders, supported laterally by a stem of glass which rises through the neck to the base of the globe. Below, these holders are fastened to wires of platinum which pass through the glass.

C. The Maxim Lamp.

The Maxim lamp is also globular in form, but it has a short neck. Within the neck rises a hollow cylinder of glass supporting upon its summit a column of blue enamel, through which pass the conducting wires of platinum which carry the carbon. The filament is made from cardboard cut by a punch into the form of an M. In section, therefore, it is rectangular, andseveral times as broad as it is thick. It is carbonized in a mould through which a current of of coal-gas is passed. After carbonization, the filament is placed in an attenuated atmosphere of hydrocarbon vapor and heated by the current. The vapor is decomposed, and its carbon is precipitated upon the filament. In this way not only are inequalities obliterated, but the resistance of the filaments may be equalized, and brought to any standard required.

D. The Lane-Fox Lamp.

The Lane-Fox lamp is ovoid in shape, the neck being in length intermediate between the two lamps last described. The carbon is in the form of a horse-shoe, and is circular in cross-section. It is made from the root of an Italian grass, largely used in France for making brooms. After carbonization, the filaments are classified according to their resistances. They are then heated in an atmosphere of coal-gas, by which carbon is deposited upon them, as in the filaments of the lamps last described. The filament in the lamp is supported by platinum wires, to which it is attached by sleeves of carbon encircling both. These wires pass through tubes in the top of a hollow glass stem. Just below the extremities of these tubes are two small bulbs containing mercury, forming the contact between the platinum wire sealed into the glass above and the copper conductor which enters from below. These conductors are held in place by plaster which fills the base of the lamp.

II. Methods of Measurement.

The question to be determined was simply the efficiency of these lamps. The efficiency of a lamp is the ratio of energy produced to energy consumed, *i.e.*, the quantity of light given to the lamp for each horse-power of current which it consumes. The data required to calculate this efficiency may be obtained when the electromotive force of the current, the resistance of the lamp when giving its light, and its illuminating power have been determined.

4. Summary of Results. (*a.*) At 16 Candles.

	Edison.	Swan.	Lane-Fox.	Maxim.
Candles	15.38	16.61	16.36	15.96
Ohms	137.4	32.78	27.40	41.11
Volts	89.11	47.30	43.63	56.49
Amperes	0.651	1.471	1.593	1.380
Volt-Amperes	57.98	69.24	69.53	78.05
Kilogram-meters	5.911	7.059	7.089	7.959
Lamps per horse-power	12.73	10.71	10.61	9.48
Candles per horse-power.	196.4	177.92	173.58	151.27
Lamps of 16 candles per horse-power	12.28	11.12	10.85	9.45

4. Summary of Results. (*b.*) At 32 Candles.

	Edison.	Swan.	Lane-Fox.	Maxim.
Candles	31.11	33.21	32.71	31.93
Ohms	130.03	31.75	26.59	39.60
Volts	98.39	54.21	48.32	62.27
Amperes	0.7585	1.758	1.815	1.578
Volt-Amperes	74.62	94.88	87.65	98.41
Kilogram-meters	7.604	9.67	8.936	10.03
Lamps per horse-power	9.88	7.90	8.47	7.50
Candles per horse-power.	307.25	262.49	276.89	239.41
Lamps of 32 candles per horse-power	9.60	8.20	8.65	7.48

VI. Conclusions.

The following conclusions seem to be sustained by the results which have now been given:

1st.—The maximum efficiency of incandescent lamps in the present state of the subject, and within the experimental limits of this investigation, cannot be assumed to exceed 300 candle-lights per horse-power of current.

2d.—The economy of all lamps of this kind is greater at high than at low incandescence.

3d.—The economy of light-production is greater in high resistance lamps than in those of low resistance, thus agreeing with the economy of distribution.

4th.—The relative efficiency of the four lamps examined, expressed in Carcel burners of 7.4 spermaceti candles each, produced by one horse power of current, is as follows:—(A.) At 16 candles: Edison, 26.5; Swan, 24; Lane-Fox, 23.5; and Maxim, 20.4. (B.) At 32 candles: Edison, 41.5; Lane Fox, 37.4; Swan, 35.5; and Maxim, 32.4.

Electricity as a Motor for Aerial Navigation.

M. Tissandier gives an account in *La Nature* of some experiments which he has carried on in regard to the propulsion of air balloons by electric motors. Since the commencement of these experiments considerable progress has been made in the construction of accumulators, but the Faure and Plante accumulators, constructed by M. de Kabath, are of considerable weight in comparison with the work which they are capable of doing. It takes but little less than two hundred and fifty kilogrammes of accumulators to produce one horse power. It would not be impossible to construct special accumulators much lighter and of large capacity, but without renouncing in any manner the secondary batteries, M Tissandier wishes to take into account all that can be obtained from primary batteries of great power. The batteries of large power are but few, numbering three: the Bunsen, the Daniell and the bichromate of potash battery. The last is the most advantageous in the present case.

After numerous experiments for determining the best composition for the exciting liquid, the nature of the jars, the limit of thickness of the carbons and zincs, the number of the latter in each element, finally to have a maximum power under or below a minimum weight, M. Tissandier constructed a model with a large surface, which has given preliminary satisfactory results. The idea of this model was obtained from seeing the bichromate batteries of M. Trouvé work in his electrical boat, and the first experiments were made with four Trouvé batteries.

The twenty-four elements, mounted in tension, put in motion a small Gramme motor of half a horse power The work produced measured was 14 kilogrammeters per second during one hour, and 10 killogrammeters during the following hour. The Gramme motor employed was not constructed to work with these batteries, and the experiment was made under the worst conditions, but it was demonstrated that the bichromate batteries are much more constant than is generally believed. The new model of battery is composed of an ebonite trough, 5 millimeters thick, measuring 0.55 m. in length, 0.16 m. in height, and about 1.14 m in width. In this trough are placed vertically thirteen carbons and twelve amalgamated zincs, arranged in alternation. The carbon plates are two and a half millimeters in thickness, the zinc plates about one millimeter. These plates are fixed to longitudinal bands of copper, which are screwed upon the exterior edge of the ebonite trough. Notwithstanding its lightness, the elements thus mounted are very solid, and may be shaken quite violently without the carbons or zincs being deranged.

The ebonite vessel is furnished with an opening in the lower part to admit a tube, which, by the aid of a rubber pipe, communicates with a receiver containing the bichromate solution. By raising or lowering the receiver above or below the battery elements, the battery may be filled or emptied. The battery contains about 4 liters of liquid strongly charged with bichromate and sulphuric acid (the composition of the liquid, in weight, is, water 100 parts, bichromate of potash 16, and sulphuric acid 37). The solution being very concentrated, the electrical resistance is less. The electromotive force of this battery is very variable, and may become considerable when the exterior resistance is very feeble. In an experiment performed with a hot and very concentrated liquid, a mean current of 110 amperes was obtained during twenty minutes with a difference of potential at the limit of 1.68 volts. This represents transferable work equivalent to 18 kilogrammeters per second. The boiling was so violent the liquid escaped outside of the vessel and put an end to the experiment.

This result may be obtained practically, but the returns which may be depended upon in the normal condition of work are favorable enough, and then the battery will be nearly constant from one hour and a half to two hours. We give the figures, from which one may form a correct idea of what may be obtained. These are the mean figures obtained by a series of experiments made upon variable resistances:

A battery of eighteen elements, arranged for tension, weighs 140 kilogrammes. Over a circuit of 0.54 ohm resistance it gives a transferable electric energy of 135 kilogrammeters per second for about one hour and a half with a current of 50 ampères. A motor adapted to this battery will yield better results. The motor weighs about 50 kilogrammes; the results obtained are as follows:

With a weight of 200 kilogrammes, battery and motor, it is possible to produce a continuous and constant work of 100 kilogrammeters per second during one hour and a half.

Some experiments already performed show that the production of electricity may be prolonged:

1st. By agitating the liquid; this is facilitated by employing communicating vessels.

2d. By adding new quantities of bichromate of potash to the warm and wasted liquid.

3d. By protecting the negative plate.

A battery of 18 elements, weighing 140 kilogrammes —the weight of two men—will probably furnish for over two hours a work of from one and a quarter to one and a half horse power, or the work of twelve to fifteen vigorous men. A similar battery with its motor may be easily carried by an elongated balloon of small dimensions, and of small diameter, and offering in consequence little resistance to the air.

While testing the power of the battery, M. Tissandier experimented with a screw attached to a dynamo-electric motor. A screw of 2.80 m. in diameter was fixed to a small Siemens dynamo-electric machine, weighing 65 kilogrammes and mounted upon a large stool. The screw is composed of two plane wings, formed of wooden frames, on which silk, varnished with gum lac, is stretched in such a manner as to form a smooth, rigid surface. Slender bands of iron strengthen the wooden arms, and small wires prevent the screw from being put out of shape during its rotation. The wings have an inclination of about thirty-five degrees. The motor was worked by a Faure accumulator, constructed by M. Reynier. The experiments were carried on in the Siemens workshop. With forty accumulators mounted in tension, the screw made 100 revolutions a minute, the armature of the motor making one thousand.

Under these conditions it was easy to calculate by the column of air displaced, that the screw worked very energetically. The current of air at from one to two meters from the apparatus was intense, and could be sensibly felt at a distance of ten meters. This fact was authenticated at the Observatory, where the system was exhibited.

The Gramme Currents in a Vacuum.

M. Jamin, assisted by M. Maneuvrier, one of his pupils, has obtained some interesting effects by passing the alternating current from a Gramme dynamo machine through a voltaic arc formed with carbon pencils in a vacuum A blue aureole enveloped the two surfaces of the carbon rods, and ultimately filled the glass bulb with light. The carbons reddened and then became of a pale white color throughout their entire length as the incandescence increased. They also volatilised, filling the bulb with carbon dust, which deposited on the inner surface of the glass and finally rendered it opaque. The bulb became filled with a bluish gas similar to vapor of iodine, which deepened to indigo tint. With bundles of carbon pencils instead of rods the volatilisation was far less marked. With rods of copper instead of cabon the same results were obtained with still greater splendor. the copper being finally deposited on the glass.

A Simple Form of Storage or Secondary Battery.

It consists of a series of shallow, thin lead trays, about one-fortieth of an inch thick, pressed and hammered into shape in a wooden mould. These trays are arranged one over another in a wooden frame. The trays are kept at an equal distance from each other by pieces of wood, which slide up and down in the stand. On this is poured an acid solution of sulphate of copper, just deep enough to immerse the bottom of the tray above. The trays should be varnished all around the edges with Brunswick black, or some other acid-resisting varnish Wires for poles are soldered to the bottom of the bottom tray, and to the top of the top tray. The battery may, of course, consist of a number of trays, and a series of batteries may be connected together.

The advantages of this form of battery are, the oxide of lead can always be kept at the most advantageous thickness. The plates or trays can also be arranged at the most advantageous distance from each other. No diaphragm of any kind is required, and therefore, however long in action, no reduced lead can weaken its action. The battery must always be kept level. Of course, it could not be used in tramcars, etc.

In making batteries on a large scale, it would be well, perhaps, to cast the trays in an iron mould, and then it would be well to have one corner of each cell cut off; and let this be done on alternate sides, to facilitate the inspection and supply of liquid. It would be well, then, to mix antimony with the lead to harden it. Possibly the trays may be made of carbon.—*W. Symons, F. C. S., in English Mechanic.*

A Galvanometer for Electric Light Currents.

At a recent meeting of the Society of Telegraph Engineers and of Electricians, London, a paper was read by Lieutenant Cardew, R. E., on a new galvanometer of his invention for measuring the most powerful electric lighting currents. The action of the instruments is based on the *nil* method of tasting—that is to say, reducing the deflection on the scale to *nil* by means of adjustments The galvanometer consists of an astatic needle placed within two independent circuits—one a coil of long, fine wire, and the other a coil of short and very thick wire—which, in fact is a stout hoop of brass in some forms of the apparatus. Through the short, thick coil the electric lightning current to be measured is passed, and through the long, fine coil is passed the current from a single standard Daniell cell. Resistance is included in the latter circuit until the two currents balance each other by differential action on the needle, and the deflection of the latter is reduced to *nil*. Then by means of a constant or multiplier, found for the instrument in question by experiment, the strength of the powerful currents in ampères can be obtained. Different forms of galvanometer on this principle were exhibited by Lieutenant Cardew to the meeting.

Electric Railway in Ireland.

Ireland, though a "most distressful counthry" in political matters, can show Great Britain the way in some things. The first electric railway in the United Kingdom is already completed, and will be very shortly running between Portrush and Bushmills, the pretty little town so noted for salmon and whiskey, close to the famed Giant's Causeway. The track is laid on a sidepath, and not in the center of the high road, and consequently will not interfere with the regular wheeled traffic. I have seen the same thing in Lombardy, where steam trams run along one side of the main roads, sometimes for twenty or thirty miles at a stretch. Our first electric railway, from Charing Cross to Waterloo, has only passed its first parliamentary stage.—*London World.*

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Our London correspondent says Electric Lighting Companies are forming there by the score, they average about two a day for the past six weeks.

There is talk of a renewal of the Crystal Palace Electrical Exhibition and also of a similar Exhibition at Manchester.

Through the courtesy of Prof. Edison and Major Eaton, we are enabled to give in this issue some interesting facts showing the progress of the Edison system of electric lighting which is now being made with success in all the principal cities in Europe, and the U. S., and we shall in the next succeeding issues of the REVIEW be able to give fuller details of the progress of the electric light matters in various places in this country.

For the information of our friends who are interested in the progress being made in other parts of the world in the Telephonic field, we have the pleasure of presenting, through the courtesy of our esteemed correspondent, Major Brown at Paris, the following concise statement of the Telephone Exchange systems in Europe to June:

Number of Telephonic Subscribers in actual operation in EUROPE.

Name of town	Name of Corporation or Co.	No. of Sub's
In FRANCE.		
Paris	Societe Generale des Telephones	1,780
Bordeaux	" " " "	178
Havre	" " " "	114
Lille	" " " "	26
Lyons	" " " "	269
Marseilles	" " " "	175
Nantes	" " " "	78
ENGLAND.		
London	United Telephone Co.	1,561
Manchester	Lancashire & Cheshire Tele'one Co	650
Liverpool	" " " "	510
Barrow	" " " "	19
Preston	" " " "	17
Blackburn	" " " "	52
Burnley	" " " "	33
Wigan	" " " "	18
Accrington	" " " "	26
Warrington	" " " "	12
In AUSTRIA.		
Vienna		334
SWITZERLAND.		
Zurich	Zurcher-Telephon-Gesellschaft	378
Basle	Gouvernement federal	235
Berne	" "	157
In BELGIUM.		
Brussells	Company Belge du telephone Bell	402
Antwerp	" " " "	651
Liege	" " " "	329
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Genoa	" " " "	348
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Milan	" " " "	244
Venice	" " " "	68
Florence	" " " "	65
Livorne	" " " "	54
Bologne	" " " "	83
Rome	" " " "	389
Naples	" " " "	182
Palermo	" " " "	90
Messini	" " " "	17
Catane	" " " "	10
In GERMANY.	Operated entirely by the Government.*	
Berlin	" " " " "	581
Breslin	" " " " "	63
Cologne	" " " " "	81
Elberfeld	" " " " "	11
Frankford	" " " " "	179
Hamburg	" " " " "	606
Liepzig	" " " " "	142
Madgebourg	" " " " "	48
Mannheim	" " " " "	139
Mulhouse	" " " " "	100
Stettin	" " " " "	don'tknow
Strasbourg	" " " " "	" "

* Price of each subscription is same in every town, viz : 200 marks (50 dollars), up to 2 kilometers and 50 marks—10 dollars—for each additional kilometer from the Central Bureau. To have a second or additional instrument in the same house and on the second line, the price is an extra 50 marks—10 dollars.

An income of $403,853,474 during the year ending with June, 1882, was more than the government has received during any previous year since 1867, and the cost of the government, including pensions, was but $187,630,093, leaving a surplus of $144,966,937 after the payment of $75,258,439 interest on the national debt. Unfortunately, the pension payment will be very heavy this year; but the interest on the debt will be $13,896,329 less than it was last year. The customs receipts, the greatest last year in all the history of the nation, $219,986,223, would be sufficient to maintain the government and slowly reduce the national debt, were the internal revenue and income from miscellaneous sources wholly to cease.

Wiring of the Mills Building, New York City.

The Mills Building, Wall and Broad Streets, has been wired for 5,588 Edison lamps. As this is the largest enterprise of the kind ever undertaken, the details may prove interesting. The conductors consist of 1,650 feet of Edison's patent electric tubes, 628 feet of lead pipe containing taped wires thoroughly insulated, 23,658 feet of zinc tubes, 75,909 feet of wire conductors, and 24,162 feet of wooded receptacles, placed between the floors, to hold the system of distributed wires. The total amount of wires used was 3,774 lbs., besides 48 vertical main cut-outs, and 253 division cut-outs. The work was done by the wiring department of the Edison Illuminating Company of New York, under contract with Mr. D. O. Mills, the owner of the building.

The young time killers fresh from college who bewail the overcrowded condition of the profession should pay attention to the demand that now exists for talent and industry in electric engineering. This is a vocation that is not crowded in the least, and, what with the improvements in telegraphy, telephones, electric lights, electric engines, and electric railroads, there is a grand field for research and energy. The possibilities of electricity are believed to be yet but slightly invaded. The invention of the telephone demonstrates how mistaken were those who thought they had caught the full force of the lightning in the clouds when they made it of service for the telegraph. Electric engines are as yet but mere toys. They may become great mechanical forces. The business is bound to be most profitable, and the demand for talent in it is greater than the supply.

Familiar Talks About Electricity and Magnetism.

Much has been said and written on the above subject; so much, in fact, that it is sometimes difficult to find anything to say. The trouble has always, however, been that a great deal is said which might be much better left unsaid; and that part which is really useful and substantial is frequently written in such an uninviting manner, that it is worse than a dose of cold drawn castor-oil to have to read it.

In the present age, which has justly been called the "age of electricity," every electrician should be well informed upon the salient points of the history of electricity. Such a knowledge will save him from a thousand snares, and frequently from the annoyance of finding, after he has invented some extraordinary electrical phenomenon, that some other philosopher, perhaps long passed to his rest, discovered the same thing forty years ago.

We cannot even yet say with certainty what electricity is; although we find one eminent scientist maintaining stoutly that it is a form of matter; another as stoutly maintaining that it is merely a form of energy, and still a third that it is a form of motion.

The very name mystifies us, and, not content with that, we have taken very good care to further mystify

ourselves. We have talked and written all kinds of rubbish about statical, dynamical, positive and negative, plus, minus, frictional and voltaic electricity, electricity of tension, and electricity of quantity, animal, magneto, thermo and hydro electricity, and so on, *ad libitum*, until the unfortunate individual who has but an ordinary inductive capacity, and who finds one electricity quite as much of a white elephant as he wants, loses count, heart and electromotive force, and resolves, in desperation, to retire into private life and forego the vain attempt of wresting the secrets of nature from her grasp by obtaining a knowledge of the "invisible force."

So, amidst these numerous titular appellations of electricity, we become so habituated to mystify and perplex ourselves, that when we do perchance obtain a glimpse of the true nature of the wonderful agent, we do not know it, and we therefore cling persistently to the antiquated ideas which we have been accustomed to regard as the genuine article.

We may materially simplify the idea for ourselves by understanding, once for all, that however fancifully we choose to designate it, giving it, if we please, names in number as the sand on the seashore for multitude, still electricity is but one force; "statical electricity" being but electricity at rest, and dynamical electricity the same agent traveling and thus performing work.

Positive and negative electricity are only different states of the same agency, and the terms are entirely arbitrary, and mean simply that the two states or conditions are opposed to each other, and may be conceived as the same thing pointing in opposite directions. The names, "positive" and "negative," are very unfortunate, because they unavoidably convey the impression to the neophyte in the study of electricity, that one electricity is more positive or potent than the other; whereas, what we call negative electricity has just as positive an existence as its opposite, and, in fact, neither can be produced without the simultaneous development of the other. The terms "plus" and "minus" are also open to the same objections; but the use of all these names has become universal, and although, like the old Greek deities, they ought to be effete, yet, as we cling in song and story to the same old mythical gods and goddesses, so also we cling to the relics of the old notions of electrical science, and it is not likely that the present generation will see the total abolition of the objectionable terms. The terms "positive" and "negative" furnished the late Sir William Snow Harris with the text for a joke on the medical profession; when, having occasion to speak of some eminent members of that profession, he remarked that "their knowledge of electricity was chiefly of the negative kind."

For the rest, the greatest number of the terms that we have cited are merely descriptive of the methods by which electricity may be produced; as, for example, "frictional" electricity is electricity excited by rubbing two substances together; voltaic electricity is that developed by a voltaic battery; thermo-electricity that originated by the application of heat to the junction of two dissimilar metals, and so on. And we might with equal propriety apply similar terms to any other of nature's forces, and talk of "frictional heat," "combustional heat," and "chemical heat."

[TO BE CONTINUED.]

Protection of Telegraph Cables.

LONDON, July 3.—In the House of Commons this afternoon Sir Charles Dilke, Under Foreign Secretary, said that the Government had agreed to attend a congress of European nations in regard to the protection of telegraph cables, if an understanding could be arrived at.

The Edison Light in Philadelphia.—The Ledger Plant.

The light in the *Ledger* building has proved so satisfactory that a larger plant has been ordered. Pending the change to the new plan, the light was temporarily stopped, but the compositors, when thus obliged to return temporarily to the use of gas, sent a committee to Mr. Childs requesting that the Edison light be restored as soon as possible.

We are pleased to learn of the promotion of Wm. I. Donshea, Esq., to the superintendency of the Companhia Telephonica de Brazil at Rio Janeiro. It is a fitting recognition of long and faithful services, his ability and efficiency are well known here, where much of his service in the telephonic field was under the charge of General Manager, Henry W. Pope. Mr. Donshea is to our knowledge the youngest superintendent in the field, being as yet scarcely twenty-four years of age.

THE EDISON ELECTRIC LIGHT IN BRAZIL.—It is stated in the *Rio News*, of Rio Janeiro, that the Edison electric light experiments in the Dom Pedro III. Station of that city have been very satisfactory.

The bombardment of Alexandria has reiterated the lessons taught by that of Algiers in 1816, and of Acre in 1840. There was a time when European soldiers believed what Eastern soldiers still believe firmly, that real strength lies in huge castles of stone many yards in height, crammed with the heaviest possible guns, and that any ship daring to face such defenses courts certain destruction. In 1770, Capt. Elphinstone dealt this theory a heavy blow by running the gantlet of the terrible "Dardanelles batteries" unharmed in a single frigate. At Algiers, in 1816, Admiral Exmouth's five ships destroyed in one day the whole seaward line of defense, the solid masonry "falling away like melting snow." In 1840, the walls of Acre were shattered, its heaviest guns dismounted, and its citadel blown to atoms, within 93 minutes of its first shot. The Russians at Sabastopol combined the old and the new systems, by answering the allied bombardment from Fort Constantine and the Telegraph Battery, the result being that whereas the great stone fort was completely disabled, the little earthwork of five guns remained unhurt while inflicting terrible damage upon the whole English squadron. Finally, three British ships of war have just come out of an 11 hours' duel with all the forts of Alexandria (four of which were destroyed by their fire) with fewer casualties than a single French broadside made on board Nelson's flagship at Trafalgar. Such facts point their own moral.

Home Interest in the News.

The Egyptian difficulty had little effect in Wall street. The market wavered after the fashion which recently has been usual, but neither bull nor bear was able to use England's war as a lever wherewith to place quotations at satisfactory points. The brokers talked much of the condition of affairs at Alexandria, but few bought or sold stocks upon opinions in the matter. At the Produce Exchange the influence was more marked. Early in the day there was a strong bull movement in wheat, but later dispatches from abroad declared that the trouble would soon be over and that the prospective demand for American grain and provisions was likely to be postponed. Prices fell correspondingly, recovering somewhat on other and different dispatches at the close of the day. Aside from any influence upon the markets, the interest shown in the matter was general and marked.

The Bell Telephone Company.

The fact that the Bell Telephone Company of Canada have announced a dividend of three per cent. for the half year has directed our attention as to what this and similar companies are doing—financially as well as for the benefit of the people, and how far, according to present appearances, it will be a rival to existing telegraph accommodation. That the telephone is yet capable of vast improvement may be gathered from the following, which we take from a paper devoted to science: "The French Minister of Posts and Telegraphs is reported to have received in Paris, from Brussels, May 21st, a telegram of 53 words, and a telephonic dispatch of 119 words, simultaneously over one wire. The system employed is the discovery of Mr. Van Kisselberghe, Director of the Belgian Meteorological Bureau. It is said that the practical advantages of this invention are estimated by the French and Belgian Governments as of the utmost importance. The distance from Brussels to Paris is about 200 miles." That invention has not reached this country as yet; when it does it will be an invaluable boon to the public, and to the press in particular. Already the Bell Telephone Company are building a line to Ottawa, thirty miles of which from Ottawa are built and ten miles from Montreal to the capital are completed. After completion, the Ottawa reporter of a speech in the House of Commons may speak from the capital to his manager here, and save enormously in time. The same company have a line working from Hamilton to Toronto—a distance of forty-five miles, by two wires, one for sending and the other for receiving. It has as much business, we understand, as it can possibly do. If the speaker from Toronto finds his friend in Hamilton absent from his place of business, the company's officer hunts him up with a card as follows: "Mr. Smith at the Toronto Telephone Office desires to speak to you. Please come to this office at your earliest convenience." In the case of confidential messages this must prove invaluable. The time occupied in sending a message and receiving a reply between the two cities, supposing the parties communicating are at each end, is about five minutes. This company can also use their lines for telegraphic communication, which will have the effect of destroying the huge monopoly recently placed in the hands of strangers to the disgust of the general public in Canada. The Bell Telephone Company is working its way quietly; the Managing Director, Mr. Size, has a thorough practical knowledge of the working of the system, and is very reticent as to the progress of the concern, but he must not think for a moment, able and reticent as he is, that Canada can be covered like a web—with a system that is going to work a revolution as great as the electric light—without being noticed, either by speculators looking out for good investments, or by the curious who want to know all about it.—*The Shareholder.*

Telegraph Tariffs Advanced in the East.

The managers of the cable companies say that thus far only Aden, Persia and South African points are affected or will be. An additional charge of 54 cents per word upon messages to these points has been ordered. Telegrams to Alexandria are sent at the risk of the senders. The Eastern Telegraph Company will make every effort to deliver them, but will not guarantee success. Telegraphic communication with India, China and Japan is not affected, as the business can be sent by the Indo-European, *via* the Black Sea and Persia, and the Siberian routes, as heretofore.

Western Union stock, 87½; American District Telegraph, 48½.

Dunand's Speaking-Condensers and Micro-Telephonic Installations.

Since the first experiments brought before the Academy of Sciences by M. Th. du Moncel, we have shown the readers of *La Nature* by what methods M. A. Dunand had succeeded in making condensers speak, which—if we except the experiments of M. C. Herz—were, up to that time, incapable of reproducing articulate speech. The result was of considerable scientific importance and showed once more the extreme delicacy of electrical action, as well as the exquisite sensibility of the hearing. We shall not now revert to these experiments, but we wish to show the practical results at which the inventor has arrived after long and interesting researches; these results are really remarkable and the experiments are very easy to repeat.

Let us first sum up briefly the arrangement of the whole system. At the transmitting station, a microphone, M, a battery, P, and the primary wire of a little coil, B, without condenser, are arranged in the same circuit; the secondary wire of the coil, B, communicates with the line and a battery, P, of a few elements, the two free extremities are connected to the plates of a little condenser, C, which constitutes the receiver. By speaking before the microphone, the intensity of the inductive current is made to vary in undulations, and in the fine wire of the coil are developed induced currents which cause the charge of the condensers to vary; these undulatory charges and discharges of the condenser make it speak, but we cannot as yet fully explain the cause of the phenomenon.

The presence of the battery, P, is indispensable in order that the condenser may articulate; the induced currents developed in the induced wire are added to or deducted from the current of the battery; the charge of the condenser varies in value, but always preserves the same direction. This has been, up to the present, the *sine quâ non* of the speaking condenser, and in all installations in which this condition has been observed, the condenser possesses this faculty in a greater or less degree.

Let us now come to the practical construction of the instruments. The microphone employed by M. Dunand, has a new form which seems to offer many advantages. It consists of two metallic plates fixed in a wooden ring and forming a case hermetically closed, in which the microphonic system is completely sheltered from the air and from the dust which so frequently soils the contacts of ordinary microphones. Each of these plates has a little button of carbon fixed to its center. Between these two buttons of carbon is a little oval-shaped piece of carbon, the length of which is somewhat greater than the distances between the inner surfaces of the buttons of carbon. This oval is held in the middle by a piece of brass wire stretched diametrically fixed at one of its extremities and connected by the other to a button, E. By twisting the wire more or less, the oval is pressed with more or less force against the two buttons and the microphone is rendered more or less sensitive. An index fixed to the button, E, moves on a graduated circle and enables the torsion of the wire to be easily regulated so as to adapt the sensibility of the apparatus to the nature of the sounds to be transmitted. The variations of resistance are produced by speaking before one of the plates; it is useless to dwell on this point which is so well known; two persons speaking, one before A, and the other before A′, can even transmit a duet which the receiving apparatus reproduces faithfully and clearly, without any regard to the often complete ignorance of the experimentalists.

The battery is composed of four ordinary Leclanche elements, connected up two and two.

The coil consists of a primary wire with about half an ohm of resistance, and the secondary has about 250 to 300 ohms.

The battery which serves to charge the receiving condensers, consists of a variable number of Leclanche elements, according to the number of receiving condensers employed. When two condensers only are used, from six to eight elements are sufficient; with the fan-shaped receiver, consisting of twelve distinct condensers arranged in derivation, from twelve to fifteen elements are required. Speech can then be heard at a distance of more than a meter.

All condensers may serve as receivers, but they do not all produce equally good effects; those which have given the best results are not more than six centimeters in thickness. The simplest model consists of thirty to thirty-six sheets of tin foil, separated by sheets of ordinary paper or paper coated with paraffin. A thin piece of wood or ebonite with a hole in the middle placed at each surface gives solidity to the system. One surface is sometimes furnished with a gutta-percha tube, which enables two persons to hear the apparatus at once, or one person to listen with both ears. In another arrangement M. Dunand uses two condensers in derivation fitted on a slight spring, which the listener places on his head. Although not very elegant this method is very convenient.

When it is required that the apparatus shall be heard by several persons at once, M. Dunand employs a receiver in the form of a fan consisting of twelve little condensers placed in derivation in a box open at the top, the condensers being separated at the top by a space about equal to their thickness. Under these conditions with five Leclanche elements at P^1, the condenser can be heard, as we have already said, at a distance of more than a metre, and with thirty elements the voice is distinguishable within a radius of five or six meters.

The condenser employed as a telephonic receiver is characterized by the clearness and exactness of tone with which it reproduces the voice, which is not interfered with by the sound of the vibrating plate, as is the case with the ordinary telephone with a metallic plate.

M. A. Dunand has turned to account the practical advantages of his microphone in order to form a system of telephony of very practical form. The apparatus, very cleverly constructed by M. Trouve, is complete in itself; on a little board are fixed the microphone, the bell, the induction coil, a pair of receiving telephones, the press button, and eight terminals destined to receive the wires of the battery, the wires of the line, and the wires of the two telephones. The arrangement of a micro-telephonic installation is thus effected in a very short time and without a possibility of error. When the telephones are suspended to the levers, which are placed to support them when not working, the communications are established with the bell; on unhanging the telephones, the levers swing and automatically establish telephonic communications. When the conversation is finished, the communications with the bell are re-established by replacing the telephones.

The sounds produced by the ordinary telephone are much more powerful than those of the speaking condenser, but on the other hand the quality of sound is more metallic, more nasal, which is not, however, a great inconvenience in ordinary applications.

The results obtained by M. A. Dunand are very interesting, since already they enable the speaking condenser to be heard at a distance; there is every reason to hope that he will not stop there, and that we shall soon have further progress to record.—*La Nature.*

Gladstone, like Lincoln, is constitutionally averse to war. But, like Lincoln, he may be destined to lead his country through her greatest war.

Electrical Railway in Holland.

In Holland the firm of Siemens & Halske, of Berlin, have supplied the necessary machines and carriages, intended for an electrical railway, the first that has been tried in the Netherlands. This electrical railway goes along the coast of the North Sea, from the watering place at Zandvoort (a station of the Haarlem-Zandvoort Railway) to the Park Kostoerloren. The opening of this electrical railway, which is two kilometers long, will shortly take place —*La Lumière Electrique.*

Havana.—The Louvre Plant.

The Edison plant illuminating the Louvre continues to create a marked sensation. There are 58 A lamps on 17 chandeliers, and 8 B lamps on one chandelier; also 4 B side-lights connected in series, making a total equivalent to 64 A lamps. The Edison lamps are arranged on the gas chandeliers so that gas and the electric light can be used either separately or together. By simultaneously shutting off the gas and putting on the electric lights, an effect is produced which is highly appreciated by the patrons of the Louvre. The current, generated in a building 500 feet distant, is conveyed by underground conductors consisting of size No. 4 Edison electric tubes, laid 15 inches under the surface of the ground. In addition to the illumination at the Louvre, a display of 60 lamps is made at the office of the Edison Company, where are also displayed hand-lamps, bracket lamps and a large out door globe containing 10 lamps, also a motor ($\frac{1}{8}$ H. P.) driving a sewing machine. The entire plant is driven by an 8 x 10 automatic cut off engine, running 150 revolutions per minute with 60 lbs. boiler pressure and an average steam pressure on piston of 40 lbs.—*From the Bulletin.*

Electric Lights in Sea Fishing.

A French paper reports a trial by government permission of an electric lure for sea fish. It consists of an electric light in a glass globe with a device for sinking it to the desired depth. As soon as the light is turned on the sea in its vicinity is illuminated brilliantly, and the fish, over whom light is well known to exercise an irresistible influence at night, come eagerly, and sometimes in large schools, within the rays. They may be seen from above disporting themselves in the unaccustomed brightness, and little dreaming of the sinister purpose with which the little fete is organized for them. It is then that other fishing boats, armed with nets, come up and set to work at the unconscious victims, which they surround as well as they can without interfering with the apparatus connected with the lighted globe. It may be supposed that this device is calculated to operate with much deadly effect whenever it is used; and there seems to be much doubt whether it will ever be allowed as a recognized kind of fishing within territorial waters. Indeed, the license granted by the government is said to be merely provisional, and for the purpose of testing the new machine.

The Electrical Exhibition of Munich.

It has been announced that an electrical exhibition was to take place in Vienna at the very same time that the one in Munich will be held. So as to prevent, however, these two exhibitions being held at the same time, and thereby prejudicing each other, the committee of the Vienna exhibition have determined to delay theirs until the months of August, September and October, 1883.

The preparations for the exhibition in Munich are carried on with great activity, and the committee

charged with the installation receive from all sides the support of the large Government administrations.

The general administration of posts, telegraphs, and railways in Bavaria place at the disposal of the committee a trial train for the lighting of the carriages and engines, and also long telegraph lines for the trial of telephonic systems. The longest of these lines, from Munich to Dresden, will be some 550 kilometres long. This administration will further undertake to put up, at their own cost, the necessary wires for hearing the different representations at the theaters, and to lay the conducting wires intended for the transmission of force. It is their intention to avail themselves for this purpose of the water force of the river Isar, estimated at 3,000 horse power, and to prove that it is possible to make use of it to light, at a distance of several kilometres, the streets and houses, and to distribute the force to the different workshops.

As regards the lighting of the streets, a committee has already been nominated, charged to study at the exhibition the different systems of electric lighting, and to decide whether they should, later on, be tried in the streets of Munich, which, no doubt, would offer a great advantage, considering the relatively high price of gas in that town.

Finally, the administration of the royal theaters is organizing in the exhibition building itself a theater, intended for experiments with the electric light, and for studying the means which electricity offers to lessen the chances of fire.—*La Lumiere Electrique.*

On June 15, the *Nature* reports that M. Marcel Deprez delivered, in the large hall of the Conservatoire des Arts et Métiers, Paris, a lecture on the transmission of electricity to great distances. He proved that magneto-electric machines could be moved through four kilometers of German silver wire, the resistance of which was 12 times that of a similar wire of copper. He also declared that he could go almost any length in diminishing indefinitely the diameter of the wire of his dynamo-magnetic machine, and that it is by resorting to large dynamos that he will be able to procure a current sufficiently powerful.

Railway Progress in 1881.

The growth of the railway system of the United States in the year 1881 was greater than in any previous year since railways first came into use a little over fifty years ago. The forthcoming volume of "Poor's Railroad Manual"—a synopsis of the general facts of which will be found in another part of this paper—shows that the increase in the length of lines in the year was 11,142 miles, making the total mileage in the United States, 104,813. Notwithstanding the short crops of 1881, the trunk-line war, and the great delays and extraordinary expenses of the winter of 1880-81, the gross earnings of the roads show an increase of nearly $110,000,000, and the net earnings an increase of nearly $22,000,000 over 1880, while the dividends paid in 1881 were $93,344,200, against $77,115,411 in 1880. The total cost of the 11,142 miles of new roads was $233,750,000, and the total investment of capital in building new lines and making improvements in addition to old ones during the year was about $400,000,000.

Large Railroad Bond Transaction.

A dispatch to S. W. Stevenson, agent of the Mexican National Construction Company, from W. W. Nevins, New York, says General W. J. Palmer has negotiated $10,000,000 worth of first mortgage Mexican National Railway bonds with a strong English and French syndicate. The public announcement of this transaction will be made to day on the London market. This insures the completion of the air-line railway from New York to the City of Mexico.

American Watches in New Zealand.

In a report on the watch and clock trade of New Zealand, Consul Griffin says that, though the introduction of American clocks and watches into New Zealand is comparatively of recent date, they have become so very popular and so general in use that the trade in them bids fair to swell to large proportions. Most of these goods reach New Zealand by way of London.

Mr. Bartlett, a leading jeweler of Queen Street, Auckland, said to Mr. Griffin:

"It is difficult to sell an English watch, and as far as the Geneva watches are concerned, they are being fast driven from the market. Everybody seems to want an American watch. I am not prepared to say that American watches are any better than other watches, but it is the fashion to have them. There is not a boy or a servant girl in the country who can raise five pounds, who does not want to invest it in an American watch."

Mr. Bartlett, while acknowledging the popularity of American watches, expresses a decided preference for the old-fashioned hand-made watch, but frankly admits that his customers do not agree with him.

Fresh Meat from New Zealand.

The sailing vessel Dunedin, belonging to the Albion Shipping Company, lately arrived in the East India Docks, London, with the first consignment of frozen meat, which has been sent to England from New Zealand. The shipment differs from all other importations of frozen meat, from the fact of having been made in a sailing vessel, which has been 98 days on the passage, during which time the holds of the ship containing the meat have been kept at about 20° below freezing point. The vessel has on board 5,000 sheep, and the apparatus for freezing was fitted up by the Bell-Coleman Mechanical Refrigerating Company.

The meat was in fine condition, and the shipment has been managed by the New Zealand and Australian Land Company (limited).

The success of this refrigerating sailing vessel ought to lead to a great extension of the trade in tropical fruits between New York and the West Indies. By the use of a refrigerating machine the immense losses now experienced by our fruit ships may be wholly overcome, and the finest fruits may be delivered here in prime condition. Vegetables may also be brought from the South without loss.—*Scientific American.*

The Microphone and Sounding Pipes.

An interesting application of the microphone to the determination of the position of nodes and ventral segments or bellies, in columns of vibrating air has been made by M. J. Lerri-Carpi, and communicated by him to the French Academy of Sciences. The microphone is mounted on an elastic membrane stretched over a little drum, and then lowered into the sounding pipe, which in most of M. Lerra-Carpi's experiments was an organ pipe having the fundamental tone do_2. When the apparatus came to a node the telephone in circuit with the microphone gave out a rumbling sound, similar to that caused by an induced current. On the other hand when the microphone passed a belly the sounds became very faint and rare; while at intermediate points they increased or diminishsed according as the microphone was brought nearer to a node or belly. While upon this subject we may also mention that M. de Rossi proposes to apply microphones as detectors of fire-damp explosions in mines. He affirms that such explosions are always preceded by undulations too feeble to be detected by the human ear; but that a sytem of microphones propely planted in the mines would indicate the danger.—*Engineering.*

Bottcher's Telephone.

This telephone differs from the systems known at present, in that the magnet, instead of being fixed in the case, as it generally is, is held suspended in it by means of screws and steel wires. By this means the magnet can participate, within certain limits, in the vibrations of the membrane, but in an opposite direction.

The apparatus consists of a cylindrical copper box, 14 centimetres in diameter and 5 centimetres high, in which the different parts are inclosed, and which is shut by a lid with a hole in the middle. To this lid and to the right of the opening is fixed a mouthpiece into which one speaks. The sounds emitted strike against a vibrating plate screwed into the lid, the vibrations of which influence the magnetism of a magnet suspended to the sides of the box by three steel wires, the tension of which can be regulated at will. The armatures on which the induction coils are fixed are not solid pieces of iron; they consist of three little slips of iron placed at a little distance from each other. Owing to this arrangement the variations of magnetism act upon them more easily and promptly.

The openings made in the circle of brass enable us to ensure the exactness of the distance between the membrane and the armatures. If it is greater or less than half a millimeter, it is rectified by means of screws above or below, by means of which the magnet is brought toward the membrane or drawn away from it. The telephones are composed entirely of metal, so that when once regulated, they require no further attention.

The plan of the system is easily understood. The magnet, owing to the elasticity of the wires, being able to oscillate slightly in unison with the vibrations of the plate, as soon as the latter approaches it, as the magnetic action increases in proportion to the square of the distance, the amplitude of the oscillation increases until the tension of the wires on the one hand, and the elasticity of the plate on the other, come into equilibrium with the attraction. On the contrary, as soon as the plate goes back, the tension of the wires brings back the magnet, and the demagnetization takes place much more rapidly. By this method, therefore, we succeed in increasing the variations of magnetism in the magnet, and, consequently, if we imagine a wire coiled round the poles of this magnet, much more forcible induction currents are produced.

The best results are obtained by bringing the mouth as near as possible to the mouthpiece, in order to speak; whereas for hearing, it is not necessary to stand so close. In a quiet place the receiver is heard at a distance of one metre, and even more.

In ordinary cases a simple call, or the sounding of a little trumpet is sufficient for a signal, as with the Gower telephone. In noisy places it will be advantageous to employ a hand telephone (Bell's model) as receiver, and a Bottcher telephone as transmitter. At each station the two telephones are placed in the same circuit.

The hand telephone, on account of its shape and its lightness, is very easily managed. The earpiece is at right angles to the magnet, which serves as a handle, and in order to hold it to the ear it is not necessary, as with the other telephones, to raise the arm and hold it away from the body.

We have here, therefore, a portable telephone, little likely to get out of order, leaving far behind it the Gower and other similar systems, and which, if employed where rapid communication is necessary, such as in the army, in mines, etc., is calculated to give the best results.—*Ex.*

Telegraphic and Telephonic Notes.

An Energetic Manager.

Mr. F. W. Kenney, the genial and live manager of the Metropolitan Telephone Exchange at Harlem, has succeeded, by his winning ways, energy and efficiency, in building up an exchange with about seventy subscribers in a district which was, until recently, considered quite unimportant. Such men as Mr. Kenney are bound to be heard from wherever they may enter the telephone field.

EDISON'S TELEPHONE TRANSMITTER PATENT.—The United Telephone Company, we hear, applied on June 2d for a disclaimer. Opposition will, in all probability, be offered by the London Globe Telephone Company, the defendants in the recent contest. —*Electrical Review.*

A National Telegraph System.

We believe it is correct to assert that the *Shareholder* was the first paper in Canada to urge the institution throughout the Dominion of a national system of telegraphy. It certainly stands alone as being the only journal which has persisted in the advocacy of that idea through good report and evil report. The enemies of the proposed innovation uncovered the strongest points of their opposition when they alleged, first, that it was placing too much new patronage at the disposal of the Government of the day; and, secondly, that it was a merely silly caprice, carried out and stubbornly continued in the face of large annual deficits. The first objection has now so practically confuted itself as not to be worth discussing. The second is more than robbed of its force in presence of the fact that the official system is at length more than paying its expenses. Its profits, indeed, are now so large that a demand already nearly clamorous is heard for the reduction of rates. Official statistics are the best argument, and we accordingly find from a late return that the total receipts for the year amounted to £1,633,886, and the working expenses, including a contribution of £12,100 to a depreciation fund to replace submerged cables, to £1,193,426. There was thus left a balance of profit of £440,460, which is equal to 4-13 per cent. on the total capital expenditure of £10,655,371. On this capital, however, the Government pays not more than 3 per cent., so that the telegraph system is now yielding a profit to the Treasury. This until recently it did not do. The net revenue derived from it was insufficient to pay the interest on the capital expended, and not unreasonably in those circumstances, the Treasury was disinclined to sanction a reduction of charges, which by further reducing the revenue would in a manner compel the general body of taxpayers to defray a portion of the expenses of those using the lines. Now, however, that obstacle to a reduction of rates is removed, and our fellow-subjects at home hope that in his next Budget, Mr. Gladstone will make provision for dispensing with a portion of the revenue now derived from the postal telegraphs, and thus enable the Department to reduce and remodel its charges. We commend these facts to the authorities at Ottawa, who are now in a position of such numerical and moral strength as to permit them to set at defiance the most formidable corporations, sole or united, if they perceive that the good of the community at large requires that such an attitude of hostility should be assumed.—*The Shareholder.*

It is estimated that the South has this season paid to the North $55,000,000 for wheat, $50,000,000 for corn, $72,000,000 for meats, and about $25,000,000 for hay, butter, cheese, oats, apples, potatoes, etc.

Barney's Telephone.

A few days since we had an opportunity of trying this instrument, an abstract of the patent specification of which appeared on page 408 of our issue of June 3d, 1882. We were unable to test it with the transmitter which Major Barney has designed for use with it, but with an ordinary carbon pencil transmitter the articulation was very good and the power all-sufficient. Before our next issue we hope to have made further trials with it. In the meantime we may remark that, to us, this form of receiver appears to be quite outside the amended Bell patent, as no plate capable of inductive action is used. —*Electrical Review.*

The United States Illuminating Company, under their contract with the Department of Public Works, are now lighting up the City Hall Park with their electric light. The lights of this company have been burning the past three weeks on Fifth avenue, from Fourteenth street to Washington Square, and this week it is expected that Washington Square, Broadway from Fourteenth to Canal street and the Battery Park will be, before the first of August, thus completing the lighting award in their contract. The lights are burning well and demonstrating that the lighting of all our main streets and avenues by electricity is now considered a public necessity.

Telephonic Litigation

Under this heading, in our issue of June 10th, we mentioned that the London Globe Telephone Company had applied for an injunction to restrain the United Telephone Company from issuing, to their subscribers, certain statements. These statements, we are informed, were these:

The United Telephone Company have been advised by eminent counsel that all forms of transmitter in which carbon is used in a free or powdered form, as for instance in the transmitters usually known as Moseley or Hunnings, and that all the so-called microphone transmitters, including those known as the Crossley and the Gower-Bell, are infringements of Mr. Edison's patent of 30th July, 1877, No. 2909, as amended by disclaimer.

No form of magneto-telephone, and no form of transmitter in which carbon or any other equivalent substance is employed, whether known as Edison's Moseley's Hunning's Crossley's, Gower's, or by any other name, can be manufactured, sold, supplied, or used in this country, except under license from the United Telephone Company, Limited. Proceedings will be taken against persons infringing the company's patent and other rights as above set forth.

The case came before Mr. Justice Fry on Thursday, the 15th, and was adjourned to allow an affidavit as to damage being filed. On being again brought bofore Mr. Justice Fry on the 22nd instant, the injunction was granted in the following terms:

"The questions I have to decide are two: The first is, are defendants acting honestly in asserting their right to issue notice complained of. As to the second case, they (plaintiffs) have to satisfy me: Are they sustaining any injury from the publication of this notice ?

"I determine in the action before, that Hunnings' transmitter could be manufactured, sold, supplied, and used in this country without a license from the United Telephone Company.

"I therefore rightly or wrongly determined the very opposite of the propositions there put forth. However great would be my sense of doubt as to the ultimate decision of the case, I must bear in mind that I am a competent judge to decide the case, and as long as the decision stands, I am bound to act on it just the same way as I would on the decision of any other judge. It is suggested that they (defendants) are doing this *bona fide*. How stands the matter about *bona fides?* In May the plaintiff complained of the present circular, the judge then read from Mr. Morris's affidavit, in which the solicitors for the defendants inform the secretary of the United Telephone Company that they must change the lists quoted from. Nothing could be more truthful on the part of the solicitors; they advised the company that it was not only advisable but was necessary, and gave what was equivalent to an undertaking that no further lists should be sent out. It seems that Messrs. Eldred & Ormes have since June, 1881, been the assigns of the Hunnings' patent, and that their royalties under this patent have been materially diminished. I am bound to say I do not think that the statement (in the notice) is one which an honest man would ever make. I do not think an honest man would desire to say in an unqualified manner that what a competent court had decided to be false, to be true. If, notwithstanding my decision, they had stated their opinion as to the superiority of the decision of Lord M'Laren to that of mine, or that they had in any way indicated that a court of competent jurisdiction had decided contrary to mine, no objection could be taken. I come to the conclusion that the company are not honestly asserting their rights when they assert a right to maintain this passage after my decision."

The judge then said that he would have to grant an injunction restraining the United Telephone Company, Limited, from issuing such notices, unless they appended thereto Justice Fry's decision to the contrary.—*London Electrical Review.*

Digest of Decisions Relating to Patents.

IRWIN TELEPHONE TRANSMITTER.

Claims Nos. 1 and 2 of Letters Patent No. 209,266, granted to John H. Irwin October 22, 1878, for an improvement in telephone-transmitter, are not infringed by an instrument in which the pressure of the electrodes is obtained by the direct strains of a flat spring.

[*Irwin *et al. v.* The Metropolitan Telephone and Telegraph Company *et al.*, 1452.]

IRWIN TELEPHONE TRANSMITTER.

Claim No. 3 of Letters Patent No. 225,388 granted to John H. Irwin March 9, 1880, for an improvement in telephone-transmitter, is not infringed by an instrument in which the vibrating disc does not have free edges and does not vibrate bodily in the sense of the patent.

[*Irwin *et al. v.* The Metropolitan Telephone and Telegraph Company *et al.*, 1452.]

BELL TELEGRAPHY.

Letters Patent No. 174,465, issued March 7, 1876, to Alexander G. Bell for improvement in telegraphy, construed.

(See Construction of Specifications and Patents, 4, 5, and 6.)

[*American Bell Telephone Company *et al. v.* Spencer *et al.*, 299.]

SALE OF PATENT BY ORDER OF COURT—TRUSTEE TO ASSIGN.

A court of equity may direct the sale of the interest of an inventor in his patent in order to satisfy a judgment obtained against him in a court of law, the writ of execution having been returned *nulla bona*, and for that purpose will require the patentee to make an assignment of the patent, as provided in section 4898 of the Revised Statutes of the United States, and in default of such assignment within a limited time will appoint a trustee, with authority to execute the same.

[*Murray *v.* Ager *et al.*, 1311.]

PATENTS—ASSIGNMENT TO PAY JUDGMENT—RECEIVER—SUPPLEMENTARY PROCEEDINGS.

A patent right issued under the laws of the United States may be required to be assigned to a receiver, under proceedings supplementary to execution, who may sell the same and apply the proceeds in satisfaction of the judgment.

[‡Pacific Bank *v.* Robinson, 1314.]

EXTENSION OF PATENTS LIMITED TO FOURTEEN YEARS FROM A FOREIGN PATENT PERMISSIBLE.

The general and broad provision for extending patents granted prior to 1861 made no discrimination against those which were limited to fourteen years from the date of a foreign patent, and there can be no reasonable doubt that Congress, in the statute of 1870, intended to leave patents granted before March 2, 1861, exactly where they were before.

[*New American File Company *v.* Nicholson File Company, 524.]

EXTENDED PATENT SUSTAINED.

A patent, therefore, applied for and obtained under the circumstances named and duly extended by the Commissioner in proper time and in regular form is valid, subject to the ordinary defences.

INCORRECT PATENT-DRAWING.

Where the Patent Office model has been destroyed, an alleged mistake in the patent-drawing should be very clearly established before a court should attempt to change by decree the position of a part represented in such drawing.

[*Royer *v.* Russell & Co., 1819.]

INVENTION—MECHANICAL SKILL.

It is no answer to such a patent to say that the combination required no invention, that any mechanic might have selected the parts and combined them. The fact that no mechanic did before select and combine the parts and produce such a machine notwithstanding the great need for it, is a sufficient reply to such a suggestion.

[*Dederick *v.* Cassell *et al.*, 1233.]

A Wail from the Telephone Operator.

The clipping we give below is taken from the columns of a newspaper published in Lynn, Mass., and purports to be the views of a long-suffering telephone operator, driven by repeated wrongs into print:

THE TELEPHONE OPERATOR—THE ENERGY OF DESPAIR, THE PATIENCE OF JOB, THE WISDOM OF SOLOMON, AND A CAST-IRON EAR, THE PROPER REQUISITES FOR A TELEPHONE OPERATOR.

MR. EDITOR: As I toil by night in the office I discover that many of the people whose *voices* I come in contact with are not aware what is in the central office, and by your permission I will tell them. The operator at the central office is a man, and to attend to his duties properly he must possess the energy of despair, the patience of Job, the wisdom of Solomon and a cast-iron ear. The business in the main is monotonous, with a sauce of romance. Up at break of day at the beck and call of every grocer's boy and spittoon wrestler in town, awake at midnight answering the maudlin tones of any inebriate who wishes to palm off that stale old joke (here I will lift my hat in reverence for its age), "have something by wire?" Hello! Hello! from night 'till morning, "Yes! all right, go ahead," and a portion of the time all is wrong, and going behind; this makes up the everyday life of the operator.

There are some pleasant people on the lines, and some nice girls, with sweet dispositions and musical voices. These somewhat reconcile the operators to their lot. Reporters are the hardest class we have to deal with. They call late, very late, for the police, and the later they get it the better they like it. They all want it, and will have it, and call for it with an assurance born of long association. "Anything new" next to "hello," is the most wearing as it is the most common note heard. It is the reporter's note, not noted for its musical qualities. Reporters know all about the telephone, and when there is trouble on the wires they know the reasons why, but they know them all wrong.

Next in pure cussedness comes the magnetic athlete. Just as the operator is about to answer he rings again in your ear. Pleasant sensation! Once will satisfy reasonable people. Following them come the shouters and howlers. They lay back their ears and shriek. The neighbors hear it; the operator does not. Operators know a great many people by *voice*. They *hear* a great deal of society, and, although they are in a certain sense secluded, they are the center around which revolves the peace and happiness of many. An operator will wear about as long as a four-ply carpet. He can be turned; *i. e.*, use his other ear, and when that gives out he is laid by for another.

The principle qualifications for an operator are a pair of ears and a voice. Now that I have exposed a few of the mysteries of the profession, let me close with this request: Don't abuse the operator, don't bang the transmitters, don't yell; treat the telephone as a modern invention of great importance, not for playing foolish jokes, but for convenience, for sociability and for business. CASTOR TIP.

The Speaking Condenser.

In a former note we announced that M. Dunand had succeeded in making the "singing condenser" of Varley act as a telephonic receiver of speech. Since his first experiment he has brought the apparatus into a more practical form. It consists of a transmitting circuit consisting of a microphone, a battery of four Leclanche cells, and the primary of a small induction coil, having about 0.5 ohms resistance. The receiving circuit is composed of the line wire, a receiving condenser or condensers, and a battery of from six to twenty Leclanche cells, according to the number of receiving condensers employed. The microphone is of a peculiar construction. Two metal plates enclosed in a ring of wood and forming a box, are connected in the circuit. Each plate has attached to its inner center a small button of carbon, and between these two buttons is a little spindle of carbon held there by a brass wire crossing the interior of the box between the two plates, and capable (by the degree of torsion given to it) of increasing or lessening the pressure of the microphonic contact between the two ends of the spindle and the buttons. All condensers will serve as receivers provided a battery be employed in the receiving circuit to keep them charged; but M Dunand prefers those having a thickness not over six centimeters, and made of thirty or thirty-six sheets of tinfoil separated by sheets of ordinary or of paraffined paper. A thin ring of wood or ebonite placed round each surface gives solidity to the pole. One side is fitted with a gutta-percha ear-piece, or two condensers hung from a head piece may be fixed upon each ear of the observer. When loud speaking is required, twelve condensers are placed in an open trough about three inches apart, and by this arrangement speech may be heard over a radius of five or six yards when a battery of thirty cells is used in the receiving circuit. —*Engineering.*

Le Microphone, Le Radiophone, et Le Phonographe.

Par Le Compte Th. du Moncel. Paris: Librarie Hatchette et Cie.

The extraordinary energy which Le Comte du Moncel shows in stringing together the scattered information which exists upon recent electrical discoveries has earned him the thanks of a large number of readers, and the present work, which he has lately brought out, has only increased the debt of gratitude which is due to him.

The book being really a collection of facts, hardly admits of criticism, as there are practically no new opinions set forth in it other than those which have already been published. We think, therefore, that it is unnecessary to say more than to strongly recommend all those who are interested in the subjects treated of to purchase a copy of the work, as they will find it well worth the money expended on it.—*Exchange.*

It is estimated that there are $3,000,000 invested in the Pennsylvania Railroad shops at Altoona. When in full operation they employ 3,500 men, and the pay roll reaches $170,000 per month. The Lancaster *New Era* estimates that the recent suspension of hands will save the company in wages nearly $100,000 per month. If the amount of work that is stopped by this suspension is taken into consideration, the saving will reach nearly $200,000 per month.

War in Egypt.

British guns are heard in Alexandria at last, and war in Egypt has begun. It is possible that it may be brief, but for the present a city of 200,000 inhabitants lies under the fire of the most terrible guns known to modern warfare. Not in form but in reality, England is avenging a massacre in which hundreds of Europeans perished. Great Britain is fighting for the sanctity of international compacts and the freedom of a great highway of the world's commerce, and is generally held justifiable by other European powers, even though some may be unwilling to accept the logical consequences of the event.

The figures which represent the spread of the telegraphic system in Europe are enormous. Russia leads, very naturally, in total length of lines, her aggregate being over fifty thousand miles. But in length of wires Germany comes first, as she has nearly a hundred and sixty thousand miles. Finally, Great Britain is highest in the number of messages, in which she reaches thirty millions. France stands very high in all these respects, without being first in any.

England's Navy.

The most powerful navy in the world is that whose guns opened fire upon Alexandria. The next most powerful is that of France, the country which is sure to side with England should the struggle in Egypt develop into a war involving the great powers of Europe. England might have begun the bombardment of Alexandria with a fleet of thirty vessels, but she used only eight. The bombarding fleet carries four 80-ton guns, whose projectiles weigh 1,700 pounds each, ten 25-ton guns, whose projectiles weigh 600 pounds each; twenty-six 18-ton guns, whose projectiles weigh 400 pounds each; twelve 12-ton guns, whose projectiles weigh 250 pounds each; and five 6 1-2-ton guns, whose projectiles weigh 115 pounds each. But were the whole available fleet of thirty vessels used, 224 heavy guns would have been brought to bear on Alexandria, the least of which can pierce a plate of iron seven and seven-tenths inches thick at a distance of 500 yards. The heaviest guns penetrate iron twenty-seven and a-half inches at the same distance, their projectiles being driven by a charge of 370 pounds of powder.

NEW SUBMARINE CABLE.—The Eastern Telegraph Company have obtained a firman authorizing it to lay down a submarine cable between Malta and Tripoli.

Miscellaneous Notes and Facts.

A Meeting.

Quite carelessly I turned the newsy sheet:
A song I wrote full many a year ago
Smiled up at me, as in a crowded street
One runs across a friend he used to know.

So full it was—that simple little song—
Of all the hope, the transport, and the truth
Which to the impetuous morn of life belong,
That once again I seemed to grasp my youth.

So full it was of that sweet fancied pain
We woo and cherish ere we meet with woe,
I felt as one who hears a plaintive strain,
His mother sang him in the long ago.

Up from their grave, the years that lay between
That song's birthday and my stern present, came
Like phantom forms, and swept across the scene,
Bearing my broken dreams of love and fame.

Fair hopes and bright ambitions that I knew
In that old time, with their ideal grace,
Shone for one moment, then were lost to view
Behind the dull clouds of the commonplace.

With trembling hands I put the sheet away.
Ah, little song! the sad and hopeless truth
Struck like an arrow when we met that day—
My life has missed the promise of its youth.

ELLA WHEELER.

Edison Lamp Company—New Factory.

[From the Bulletin.]

The moving of the lamp factory from Menlo Park to East Newark affords a fitting occasion for making a brief mention of the history of the Edison Lamp Company. The manufacture of lamps was commenced at Menlo Park in November, 1880. Prior to that date, a large number of lamps had been made, but the first regular pay-roll of the Lamp Company, as an organization distinct from the laboratory and the experimental department of the Light Company, was November 11th, 1880, which may be taken as the date of the starting of the Factory. From that time until April 1, 1882, when moving to Newark was commenced, the factory was running all the time, except about six weeks. The largest number of men employed at any one time was 135, and for the last year there has not been at any time less than 100 hands employed. Up to April 1, 80,000 lamps were shipped, and at that time there were about 50,000 unsold in stock. The reason for moving the factory to East Newark is to secure larger buildings, with increased facilities, also convenient accommodation for workmen, and to be nearer the source of supply for obtaining reliable help. The manufacturing of lamps was begun in the New factory at East Newark on the first of June, 1882, and 150 men are now employed. The tools and power now in the factory are adequate for making 1,200 lamps a day, but the factory has an ultimate capacity of 40,000 lamps a day, which will require from 3,000 to 4,000 hands, according to the style of lamps made. The lamp factory has always been managed with unusual skill and intelligence, and all visitors have united in praising the perfection of the system and the economy and precision of the work. The officers of the Edison Lamp Company are as follows, viz.: Thomas A. Edison, president; Francis R. Upton, treasurer; William Holzer, superintendent; and J. J. Bradley, master mechanic.

At the end of the war it took $150,977,697 a year to pay the interest on the national debt, but now $57,360,110 will do it. The payment is equal to about $1 08 for every inhabitant, or less than one-fourth of what it was in 1865. The debt is now $1,549,790,806, and has decreased $151,684,351 during the year ending with June. It is now easily manageable, and even in hard times would cause no great inconvenience.

The Brockie Arc.

At the recent Electrical Exhibition in the Crystal Palace, the British Electric Light Company showed a very interesting projection on a screen of the arc formed by the carbon points in the Brockie lamp. This lamp was illustrated in *Engineering*, vol. xxxi., p. 93, and the arc is regulated at every half minute by an automatic device, which breaks the circuit for an instant and allows the positive carbons to come into contact with the negative one and be again withdrawn to the normal distance. This mode of regulation reduces the carbon points to a peculiar shape, which is different from that of the ordinary pencils. We are indebted to Mr. J. B. Bright, the representative of the company at the Crystal Palace, for a photograph of this arc taken by its own light, and it is curious to note that the negative carbon acquires the form of a truncated cone, and presents a flat tubular surface to the positive carbon, which has a peaked or mammiform shape. The slopes of the peak take different angles, as if the glowing sphere of the arc consisted of several luminous shells instead of a single envelope. The practical advantages of such a form of arc lies in the fact that when the negative carbon is placed uppermost its flat white-hot surface acts as a reflector shedding down the light of the arc upon the space below.—*Ex.*

Hundreds of Millions for Pensions.

From a memorandum recently compiled by the Commissioner of Pensions it appears that the actual amount paid for pensions on account of the late war to March 1, 1882, is $500,781,950.

It is estimated that there are now on the pension roll the names of 250,000 pensioners of the late war. This does not include 30,000 (estimated) service pensions on account of the war of 1812.

Estimating the disbursements for May and June, the total paid for pensions during the current fiscal year will not vary much from $65,000,000. On April 1, 1882, there were on file 217,162 pending claims, which, if allowed, would be entitled to arrears estimated at $214,990,800.

There are 53,179 pending claims which were filed subsequent to the limitations imposed by the Arrears act.

If the two classes just referred to should be at once added to the roll, it would increase the annual value of pensions $21,500,000, which, added to the present annual value, would make $54,800,000.

The United States leads all the principal countries of the world in the amount of coinage, while previously to the discovery of gold in California and silver in Nevada, it occupied the tenth place. The gold coinage of the United States mint since 1849 has amounted to $1,135,495,475; the amount of silver coinage to $246,491,888; making a total of $1,381,987,633.

Since 1849 the coinage of gold has doubled, while that of silver has increased but 16 per cent. Formerly the coinage of silver predominated, but within the last third of a century the position of the two metals has become reversed. Prior to that date the United States were importers of the precious metals; but since that date the United States have exported $1,827,435,960 to foreign countries.—*Boston Economist.*

Valuation of City Real and Personal Estate—Forty-seven Millions Increase.

The Commissioners of Taxes and Assessments sent to the Board of Aldermen the assessment rolls of real and personal estate in New York for 1882. The following shows the assessed valuation of the real estate in 1881 and 1882, with the increase or decrease, the valuation of the personal estate in those years, and the net increase in the valuation of the real and personal estate:

	1881.	1882.
Total real and personal estate	$1,185,948,093.96	$1,233,476,398.33
Total increase, 1882		59,349,679.00
Total decrease, 1882		11,821,379.63
Net increase		$47,528,299.37

The sum to be raised by taxation this year on this valuation is $27,412,831.56.

Anxious to be Neighborly.

From the Detroit Free Press.

He was a small boy, with dirt on his nose and a faded straw hat on his head, and feet long unwashed. He walked boldly up the steps, pulled the bell, and when the lady came to the door he said:

"Say, can you lend ma your telephone for a few minutes?"

"Why, I can't!" she gasped out.

"We'll bring it back in half an hour."

"But I can't lend it, child. You don't seem to know what a telephone is. Who are you?"

"We live around the corner—just moved in, and we want to be neighborly. I tried to borrow your wheelbarrow and shovel, but your boy wouldn't lend 'em, and our hired girl has been over to borrow tea and sugar and couldn't get any. We kinder thought we might borrow your telephone or something, and ma would bring it back and get a chance to see your style and ask you to run right in with your old clothes on?"

In the Depot.

Just before a Western-bound train left the Union Depot one morning recently, a masher with his little grip-sack, slid around to a woman standing near the ticket office and remarked:

"Excuse me, but can I be of any assistance in purchasing your ticket?"

"No, sir!" was the short reply.

"Beg pardon, but I shall be glad to see that your trunk is properly checked," he continued.

"It has been checked, sir."

"Yes—ahem—you go West, I presume?"

"I do."

"Going as far as Chicago?"

"Yes, sir."

"Ah—yes—to Chicago. I also take the train for Chicago. Beg your pardon, but didn't I meet you in Buffalo last fall?"

"No, sir."

"Ah! then it was in Syracuse?"

"No, sir!"

"No? I wonder where I have seen you before?"

"You saw me enter the depot about five minutes ago with my husband, I presume!"

"Your husband?"

"Yes, sir; and if you'll only stay around here three minutes longer, you'll make the fifth fellow of your kind that he has turned over to the coroner this month!"

Some mashers would have made a run for it, but this one didn't. He went off on the gallop, and as he wanted to go light, he left his grip-sack and a ton of brass behind him.—*Detroit Free Press.*

"Papa, are you the president of this railroad?"

"Yes, my son."

"How far have we traveled on this train?"

"Oh, about five hundred miles, I guess; but why do you ask?"

"Because I think it time we came to a watering trough."

"A watering trough! Why do you want to come to a watering trough?"

"Because, when we go riding with the horses and carriage we stop at watering troughs and water the horses."

"Of course, but the cars don't need any water."

"Well, then, what did you mean this morning when you told Uncle Judson you were going to water the stock of this railroad?"

"Don't be so inquisitive, my son," replied the railroad king, as he resumed reading the *Derrick*, and the train sped on its way.—*Oil City Derrick.*

Defining a Gentleman.

By Cardinal Newman.

It is almost a definition of a gentleman to say he is one who never inflicts pain. This description is both refined and, as far as it goes, accurate.

He is mainly occupied in merely removing the obstacles which hinder the free and unembarrassed action of those about him: and he concurs with their movement rather than take the initiative himself. His benefits may be considered as parallel to what are called comforts and conveniences in arrangement of a personal nature; like an easy chair or a good fire, which do their part in dispelling cold and fatigue, though nature provides means of rest and animal heat without them The true gentleman in like manner carefully avoids whatever may cause a jar or jolt in the minds of those with whom he is cast; all clashing of opinion, or collision of all restraint or suspicion, or gloom or resentment, his great concern being to make every one at their ease, and at home. He has his eyes on all his company, he is tender toward the bashful, gentle toward the distant, and merciful toward the absurd; he guards against unreasonable allusions or topics which may irritate; he is seldom prominent in conversation, and never wearisome. He makes light of favors, while he does them, and seems to be receiving what he is conferring. He never speaks of himself except when compelled never defends himself by a mere retort; he has not ears for gossip, is scrupulous in imputing motives to those who interfere with him, and interprets everything for the best.

He is never mean or little in his disputes, never takes unfair advantages, never mistakes personalities or sharp sayings for argument, or insinuates evil when he dare not say out.

From a long-sighted prudence, he observes the maxim of the ancient sage, that we should conduct ourselves toward our enemy as if he were one day to be our friend. He has too much good sense to be affronted at insults, and too well employed to remember injuries. He is patient, forbearing and resigned, on philosophical principles; he submits to pain, because it is irreparable; to death, because it is his destiny. If he engages in controversy of any kind, his disciplined intellect preserves him from the blundering discourtesy of better, perhaps, but less-educated minds, who, like blunt weapons, tear and hack instead of cutting clean; who mistake the *point* in argument, waste their strength on trifles, misconceive their adversary, and leave the question more involved than they find it.

He may be right or wrong in his opinion, but he is simple as he is forcible, and as brief as he is decisive. Nowhere shall we find greater candor, consideration, indulgence.

He throws himself into the minds of his opponents, he accounts for their mistakes, he knows the weakness of human reason as well as its strength, its province and its limits.

Milan, Italy.—The following is a trans'ation of a letter addressed to Mr. Shepherd, connected with the Edison light in Italy, relating to the successful introduction of the light in Milan:

James Shepherd, Esq., Milan:

The experiments of incandescent electric lighting (Edison system), carried out by you for over twenty nights in the largest Foyer of the Scala Theater here, succeeded in a manner so satisfactory as to arouse the most general admiration. All those persons who had the opportunity of assisting at these most successful experiments carried away with them the thorough conviction that the wonderful invention of Edison marks a gigantic progress in the difficult problem of lighting by electricity, and that very little was now left to arrive at the desired perfection. The Municipal Council of the city of Milan, Italy, glad to be in a position to make publicly known to the citizens this miracle of science, and happy to be in position also to corroborate the exactness with which the above experiments were arranged and carried out by you, have the greatest pleasure and most lively satisfaction in testifying and informing you of its satisfaction, and enclose you the present as a testimonial of the splendid success of the above experiments

With all esteem,

The Mayor of the City of Milan,

Belinzaghi.

Army Retirements.

Washington, July 8.—Maj.-Gen. Irwin McDowell, commanding the Military Division of the Pacific, will be placed on the retired list in October next, under the provisions of the compulsory retirement. It is generally understood that Maj -Gen. John M. Schofield, who is at present without a command, will succeed Gen. McDowell in the command of the Division of the Pacific. Gen. W. T. Sherman will be retired in February, 1884; Lieut.-Gen. Sheridan in 1895; Maj.-Gen. Hancock in March 1888; Maj.-Gen. Schofield in 1895; Brig -Gen. John Pope, July, 1886; Brig.-Gen. Oliver O. Howard, 1894; Brig.-Gen. Alfred H. Terry, 1891; Brig.-Gen. Christopher C. Augur, August, 1885; Brig.-Gen. Geo. Crook 1892.

German Army Statistics.

A return presented a few days ago to the German Federal Council respecting the state of recruiting in the Inperial army in the year 1881 shows that in all Germany, exclusive of Bavaria, the total number of young men liable for service was, 1,154,257. Of this number 481,296 were in their twentieth year, 347,488 in their twenty-first year, and 281,080 in their twenty-second year; the remainder, 54,393, being of higher age. Out of the grand total there were 287,032 drawn for service, of whom 18,002 were volunteers; 145,334 were placed in the supplementary reserves, while the number of recruits who had to enter the regular army for three years' service under the colors was 123,366. The number of men who, on various grounds, including physical disqualifications and others, were wholly or temporarily excused from serving was 723,688. There were in addition 13,804 supernumeraries liable to be called up at any moment to serve under the colors. One of the most startling points in the official reports is that referring to defaulters or absentees. It appears that last year there were altogether close upon 130,000 men who, being liable to service, failed to report themselves when called up. This is equal to fully 11¼ per cent. of the grand total. Compared with the men drawn for the regular three years' service under the colors (123,366), the absentees, (129,633) actually outnumbered them in the proportion of 105 to 100. Another fact not generally known in connection with the "model army of the world" refers to the punishments awarded for evasion of military service. Thus in 1881 there were no fewer than 11,580 young men condemned to loss of all civil rights for emigrating without permission; and there were in addition 13,006 offences of the same kind still under investigation when the report was made up.—*St. James's Gazette.*

Canada and Brazil.

The attempt to open direct trade between Canada and Brazil having now fairly commenced, some recent remarks made by the British Consul at Rio, and subsequently published under official authority, will be opportune here. That official reports: "The stubbornness of English manufacturers in persistently clinging to old forms and styles, quite in defiance of their suitability to the special requirements of this market contributes largely to the fact that German and American goods are gaining ground here; for, while both German and American manufacturers study the likings of the particular market the goods are intended for, and endeavor to follow out as closely as possible the suggestions and wishes of their customers, even in relatively small orders, the English manufacturers seem to consider that people ought to want what they make, and treat any special recommendation or suggestion of their customers as beneath notice, apparently being of opinion that what was good fifty years ago and made a fortune for their fathers must be good enough now." This is a fair and an excellent hit-off of a too-prevailing and thoroughly English and thoroughly stupid conservatism, so-called. The character of our present Canadian export to Brazil is not such as to be likely to enable us to make any immediate use of this hint, and some time may probably elapse before we shall find it profitably available. The advice, however, should be stored up and remembered for future use, as sooner or later it will become serviceable.—*The Shareholder, Montreal.*

A Bostonian has an invention which he asserts will bring any vessel, however large, to a stop in from one to ten feet, and will hold her steady as a rock, with full steam on. This invention he terms a "ship brake," and attached to the contrivance is a self-acting appliance which, during dark nights, or thick or foggy weather, will render impossible, in his opinion, any collision with floating bodies. The device consists of a pair of iron shutters, or "fins," hinged one on each side of the sternpost of a vessel, and shutting close to its sides from the sternpost forward. The "fins" are kept tightly closed by a simple apparatus on deck, which is connected with the pilot-house, and when opened the stays connected with the "fins" allow them to open at right angles with the ship, holding it fast as if anchored.

"Not Dead, but Spachless."—A son of the Emerald Isle had the misfortune one day to fall into his well. His wife hearing the commotion, rushed out in great consternation, and going to the side of the well, called down, Barney! Barney, are you there? "Faith an' I am," came back faintly from the bottom of the well. Barney! Barney are you dead! "No, but I'm spachless?"

The Egyptian Crisis.

It is reported that Lieutenant Marriott, of the *Monarch*, is organizing a volunteer force among the Europeans obliged to remain at Alexandria, and has established telephonic and heliographic communication with the fleet.

NEW PATENTS—ELECTRICAL—1882.

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JUNE 13TH, 1882.

259,612. Device for Suspending Electric Arc Lamps. Addison G. Waterhouse, New York, N. Y., assignor to the United States Electric Lighting Company, same place. Filed April 15, 1882. (No model.)

259,617. Dynamo-Electric Machine. Edward Weston, Newark, N J., assignor to the United States Electric Company, New York, N. Y. Filed Dec. 13, 1881. (No model.)

259,618. Dynamo-Electric Machine. Edward Weston, Newark, N. J., assignor to the United States Electric Lighting Company, New York, N. Y. Filed December 13, 1881. (No model.)

259,404. Electro-Magnetic Motor. George Little, Passaic, N. J. Filed March 1, 1882. (Model.)

259,477. Electric Arc Lamp. Frank H. Burger, Plainfield, N. J. Filed December 14, 1881. (No model.)

259,558. Electric Switch Board. Thomas W. Lane, Boston, Mass., assignor to Charles Williams, Jr., same place. Filed April 7, 1882. (No model.)

259,589. Electric Railway. Charles H. Rudd, Evanston, Ill , assignor to James W. White, James Clarence White, and H. M. Lewis, Trustees, Philadelphia, Pa. Filed April 6, 1882. (No model.)

259,593. Electric Safety Elevator. Henry B. Sheridan, Cleveland, Ohio, and Hermann A. Gorn, New York, N. Y. Filed Dec. 2, 1881. (No model.)

259,645. Magneto Generator. Thomas W. Lane, Boston, assignor to Charles Williams, Jr., Somerville, Mass. Filed February 28, 1882. (No model.)

259,547. Magneto Electric Railway Signal. John B. Johnson and Orville B. Johnson, Boston, Mass. Filed January 21, 1882. (No model.)

259,362. System of Electric Lighting for Railway Trains. Charles E. Buell, New Haven, Conn. Filed April 19, 1882. (No model.)

259,614 Safety Device for Electric Circuits. Edward Weston, Newark, N. J., assignor to the United States Electric Lighting Company, New York, N. Y. Filed January 5, 1882. (No model.)

259,615. Safety Device for Electric Currents. Edward Weston, Newark, N. J., assignor to the United States Electric Lighting Company, New York, N. Y. Filed January 10, 1882. (No model.)

259,616. Safety Device for Electric Currents. Edward Weston, Newark, N. J,, assignor to the United States Electric Lighting Company, New York, N.Y. Filed January 5, 1882. (No model.)

259,657. Secondary Battery. John S. Sellon, Hatton Garden, County of Middlesex, England. Filed April 3, 1882. (No model.) Patented in England September 10, 1881, No. 3,926.

259,285. Telephone Signaling Circuit. Geo. H. Bliss, Pitsfield, Mass. Filed October 20, 1881. (No model.)

259,286. Telephone Circuit. George H. Bliss, Pittsfield, Mass. Filed November 12, 1881. (No model.)

259,359. Telephonic and Telegraphic Signaling Apparatus. Alfred C. Brown and Henry A. C. Saunders, London, England. Filed February 2, 1882. (No model) Patented in England July 7, 1881. No. 2,995.

259,428. Telephone Call-Register. James W. See, Hamilton, Ohio, assignor to the Yale Lock Manufacturing Company, Stamford, Conn. Filed October 22, 1881. (No model.)

259,610. Transmitter for Printing Telegraph. Henry Tan Hoevenbergh, Elizabeth, N. J.

FOR THE WEEK ENDING JUNE 20TH, 1882.

259,791. Dynamo-Electric Machine. Charles E. Ball, Philadelphia, Pa. Filed November 21, 1881. (No model.)

259,689. Electric Detecting Apparatus for Watchmen. Charles W. Hubbard, Boston, Mass. Filed December 5, 1881. (No model.)

259,690. Electric Detecting Apparatus for Watchmen. Charles W. Hubbard, Boston, Mass. Filed March 22, 1882. (No model.)

259,691. Electrical Apparatus for Medical Purposes. William Humans, Cambridgeport, Mass. Filed January 9, 1882. (Model.)

259,756. Electric Arc Lamp. Robert J. Gulcher, Bials, Austria. Filed Nov. 17, 1881. (No model.) Patented in Germany Nov. 8, 1879, No. 10,333; in France March 10, 1881, No. 141,632; in Austria Nov. 12, 1881, No. 28,431; in Hungary November 12, 1881, No. 41,673; in Spain November 22, 1881; in Italy November 26, 1881; xv, 13,550, xxvii, 93; in Sweden November 23, 1881; in Norway November 29, 1881; in Portugal January 18, 1882, No. 722, and in Russia, January 25, 1882, No. 368.

259,816. Electric Conductor for Fire Alarms. P. A. Charpentier, Paris, France Filed December 5, 1881. (No model.) Patented in France July 1, 1880, No. 137,558.

259,817. Electro-Magnetic Dispatch Tube. Charles A. Cheever, New York, N. Y. Filed February 25, 1882. (No model.)

259,763. Incandescent Electric Lamp. John Jameson, Newcastle-upon-Tyne, England. Filed February 1, 1882. (No model.) Patented in England October 12, 1881. No. 4,439.

259,809. Means for Utilizing Secondary Batteries on Telephone Circuits. Charles E. Buell, New Haven, Conn. Filed April 20, 1882. (No model.)

259,831. Pipe for Underground Electric Wires. Patrick J. Duggan, Boston, Mass., assignor of one-half to George T. McLaughlin, same place. Filed February 18, 1882. (No model.)

259,971. Underground Conduit for Telegraph, Telephone and other wires. Thomas J. Agnew, Philadelphia, Pa., assignor of three-fourths to Barrett & Cattell and George W. Sheppard, Jr., same place, and Harrison A. Thompson, May's Landing, N. J. Filed December 31, 1881. (No model.)

A printed copy of the specification and drawing of any patent published herein, also of any patent issued since 1865, will be furnished by any of the patent solicitors whose advertisements appear in this journal. In ordering, please state the number and date of the patent desired.

We have just received the last number of *Trubner's American, European and Oriental Literary Record*, published by Messrs. Trubner & Co., 57 Ludgate Hill, London, England. It is a complete register of all the most important works published in North and South America, India, Europe and the British Colonies. It is published monthly, and the subscription price for twelve numbers is five shillings; single numbers, one shilling.

Messrs. Trubner & Co., 57 and 59 Ludgate Hill, London, have imported or can supply, all works mentioned in this *Literary Record*. Intending purchasers having any difficulty in procuring them, should communicate direct with the publishers of it. It would be imprudent to import many works in large quantities, but all specified can be supplied if a reasonable time be allowed, excepting those containing copyright matter, or in any way infringing British copyright law.

From *Trubner's American, European and Oriental Literary Record*, London, England:

NEW YORK REVIEW OF THE TELEGRAPH AND TELEPHONE.—The recent rapid strides made in telegraphic and telephonic science encouraged Mr. George Worthington, of New York, to commence publishing last January an electrical journal of the above title. We have examined the numbers that have appeared, and can candidly say that, if specialists wish to have the latest news on these subjects, they will not be without this journal.

A test was made, a short time since, of the new Worthington pumping engine, at the Alton (Ill.) water works, erected by Mr. Frank H. Pond, of this city, says the St. Louis *Age of Steel*. The contract was to pump 1,500,000 gallons per day, against a pressure of 110 pounds. The pump not only did this, but was worked up to a capacity of 1,750,000 gallons per day, with fifty pounds of steam at the pump.

Government Actuary Elliott predicts that the population of the United States will be 81,000,000 in 1900. As that date is but eighteen years away, and emigration is now adding 1,000,000 a year to the population, the prediction is not a wild one. The population at the present moment must be nearer 55,000,000 than 53,000,000.

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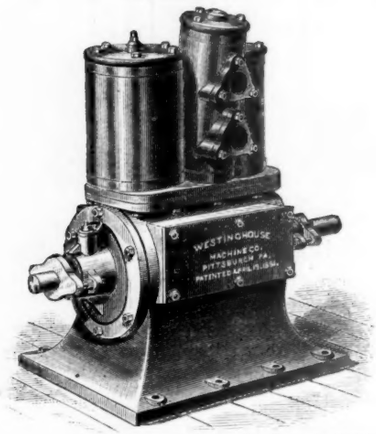

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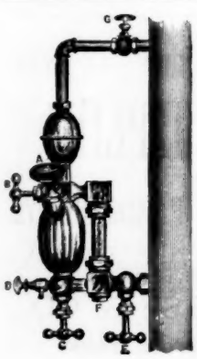

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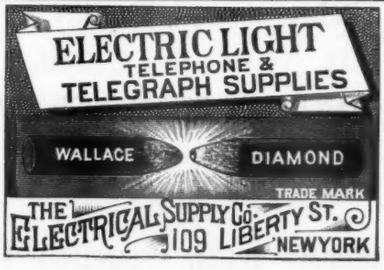

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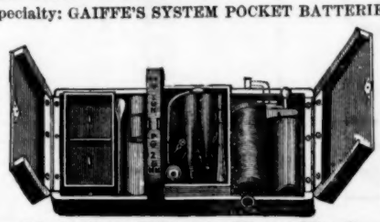

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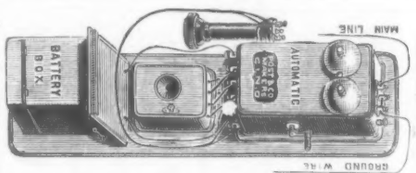

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